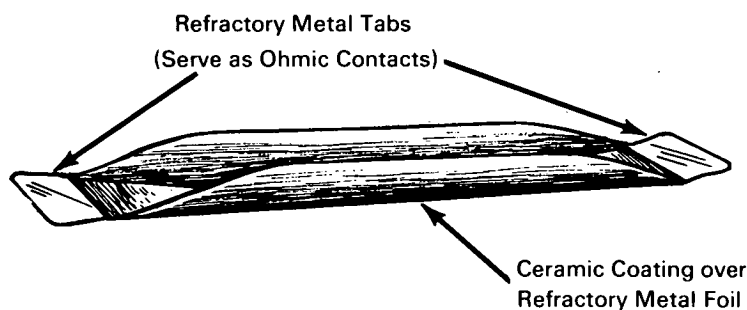


# NASA TECH BRIEF



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## Ceramic-Coated Boat Is Chemically Inert, Provides Good Heat Transfer



**The problem:** Providing an improved boat to be used as a container for metals or other inorganic materials that are to be evaporated in a vacuum furnace or evaporator. The boat must have good thermal conductivity, be physically strong, and chemically inert to the evaporants. Metal forms, twisted wire filaments, and ceramic crucibles which have been used as boats do not meet all of these requirements.

**The solution:** A boat made of a refractory metal foil which is coated with a ceramic by flame spraying. The ceramic coating is chemically inert to most evaporants and is in intimate thermal contact with the metal that serves as an ohmic heating element.

**How it's done:** A boat of the desired size and shape is formed from a 0.002-in.-thick foil of a refractory metal (e.g., 90% tantalum, 10% tungsten), leaving a tab at each end. The foil boat is rigidly clamped at each tab in a fixture to facilitate surface preparation and flame spraying. By clamping the boat in this manner, the ceramic spray is prevented from coating the tabs and thus permits them to be used as electrical contacts when the boat is installed in the vacuum chamber. The boat is then sprayed with a nickel-alumina preparation which cleans the surfaces of the

refractory metal foil and ensures a tightly adhering bond between the foil and the ceramic. The final step consists of flame spraying the treated surfaces of the foil with a ceramic coating consisting of zirconium oxide or chromium oxide.

### Notes:

1. Boats or crucibles can be made in various configurations and sizes, with integral ohmic heating elements.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer  
Langley Research Center  
Langley Station  
Hampton, Virginia, 23365  
Reference: B65-10063

**Patent status:** NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

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(Langley-90)

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